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EXAMINER	
CHAU, COREY P	
ART UNIT	**PAPER NUMBER**
2615	

DATE MAILED: 09/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/758,606	POMPEI, FRANK JOSEPH	
	Examiner	Art Unit	
	Corey P. Chau	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25 and 27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25 and 27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/21/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/19/2006 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 25 and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by USPN 5870351 to Ladabaum et al. (hereafter as Ladabaum).

4. Regarding Claim 25, Ladabaum discloses an acoustic transducer array, comprising:

a backplate including a surface and a plurality of respective depressions of varying dimensions formed on the surface (abstract; Figs. 2, 3A-3F; 9A-9H); and

a membrane adjacently disposed along the backplate (abstract; Figs. 2, 3A-3F; 9A-9H),

wherein the membrane and at least one of the plurality of respective depressions define at least one acoustic transducer (abstract; Figs. 2, 3A-3F; 9A-9H; column 2, lines 30-41; column 4, lines 16-32), and

wherein the dimensions of the respective depressions are set to determine the center frequency and the bandwidth of the at least one acoustic transducer (abstract; Figs. 2, 3A-3F; 9A-9H; column 2, lines 30-41; column 4, lines 16-32),

wherein the acoustic transducer array has a bandwidth greater than 5 kHz (abstract; Figs. 2, 3A-3F; 9A-9H; column 2, lines 30-41; column 4, lines 16-32).

5. All elements of Claim 27 are comprehended by Claim 25. Claim 27 is rejected for the reasons stated above apropos to Claim 25.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to

be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 10-17, and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura et al. (hereafter as Kamakura).

8. Regarding Claim 1, Manabe discloses a parametric audio system for generating at least one airborne audio beam (abstract), comprising:

at least one audio signal source configured to provide at least one audio signal (Fig. 1, 3-4; column 2, line 58 to column 3,line 15).

Manabe does not expressly disclose at least one signal conditioner configured for receiving the at least one audio signal and for nonlinearly processing the audio signal to provide at least one pre-distorted signal. Kamakura discloses a signal conditioner comprising an envelope detector and square-root utilized to reduce distortion (Fig. 1; page 215). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe to utilize a signal conditioner comprising a envelope detector and square-root in order to reduce distortion.

Manabe as modified discloses:

a modulator configured to receive the pre-distorted signal and to convert the pre-distorted signal into ultrasonic frequencies (Manabe, Figs. 1, 3-4; column 2, lines 58 to column 3, lines 22); and

an acoustic transducer array including at least one acoustic transducer, the array being configured to receive the converted signal and to project the converted signal through the air along a selected path, thereby inverting distortion in the projected signal and regenerating the audio signal along at least a portion of the selected path with reduced net distortion (Manabe, Figs. 1, 3-4; column 2, line 58 to column 3, line 40; Kamakura, Fig. 1; page 215),

wherein the acoustic transducer array has a bandwidth greater than 5 kHz (Figs. 1, 3-4; column 3, lines 8-15).

9. All elements of Claim 10 are comprehended by Claim 1. Claim 10 is rejected for the reasons stated above apropos to Claim 1.

10. Regarding Claim 11, Manabe as modified discloses at least one driver amplifier coupled between the modulator and the acoustic transducer array and configured to receive the converted signal (Manabe, Figs. 1, 3-4); wherein the converted sisal is an undivided signal, wherein the driver amplifier is further configured to generate an amplified signal representative of the undivided converted signal (Manabe , Figs. 1, 3-4). Manabe as modified does not expressly discloses a matching filter configured to compensate for a non-flat frequency response of the combination of the acoustic transducer array and the driver amplifier. However the examiner take Official Notice that it is well known in the art to provide a matching filter, which serves to compensate for the specific transducer transfer characteristic and thus provide a flat overall frequency response, which tailors to match the output shaping characteristics of an amplifier. Therefore it would have been obvious to one having ordinary skill in the

art at the time the invention was made to modify Manabe as modified to provide a matching filter, which serves to compensate for the specific transducer transfer characteristic and thus provide a flat overall frequency response, which tailors to match the output shaping characteristics of an amplifier.

11. Regarding Claim 12, Manabe as modified discloses a transducer and a modulated carrier signal and it is implicit that the transducer has an area and the modulated carrier signal has an amplitude, wherein the area and the amplitude is used derive a loudness.

12. Regarding Claim 13, Manabe as modified discloses a plurality of electro-acoustic transducers may be arrayed, and the number thereof can be adjusted depending on a desired sound pressure, but does not expressly a loudness greater than $(2.0x10^{4})$ Pa^{2} x in^{2}. However the examiner take Official Notice that it is well known in the art that the plurality of electro-acoustic transducers may be arrayed, and the number thereof can be adjusted to obtain the desired sound pressure, such as a loudness greater than $(2.0x10^{4})$ Pa^{2} x in^{2}. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe as modified to adjust the number of transducer to obtain the desired sound pressure, such as a loudness greater than $(2.0x10^{4})$ Pa^{2} x in^{2}.

13. Claim 14 is essentially similar to Claim 13 and is rejected for the reasons stated above apropos of Claim 13.

14. Regarding Claim 15, Manabe as modified discloses at least one driver amplifier configured to receive the modulated carrier signal and to generate an

amplified signal I representative of the modulated carrier signal (Figs. 1, 3-4). Manabe as modified does not expressly discloses the driver amplifier includes an inductor coupled to a capacitive load of the acoustic transducer array to form a resonant circuit having a resonance frequency approximately equal to the frequency of the ultrasonic carrier signal. However, the examiner takes Official Notice that it is well known in the art to provide an inductor coupled to a capacitive load of the acoustic transducer array to form in order to provide the desired power oscillation. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe to utilize an inductor coupled to a capacitive load of the acoustic transducer array to form in order to provide the desired power oscillation.

15. Regarding Claim 16, Manabe as modified discloses the frequency of the ultrasonic carrier signal is greater than or equal to 45 kHz. (Figs. 1, 3-4; column 1, line 63 to column 2, line 24).

16. Regarding Claim 17, Manabe as modified discloses the frequency of the ultrasonic carrier signal is greater than or equal to 55 kHz. (Figs. 1, 3-4; column 1, line 63 to column 2, line 24).

17. All elements of Claim 19 are comprehended by Claim 15. Claim 19 is rejected for the reasons stated above apropos to Claim 15.

18. Claim 20 is essentially similar to Claims 1 and 11 and is rejected for the reasons stated above apropos to Claims 1 and 11, except Manabe as modified does not expressly disclose a delay circuit configured to apply at least one predetermined time delay to the at least one converted signal. However, the

examiner take Official Notice that it is well known in the art to provide a delay circuit configured to apply at least one predetermined time delay to the at least one converted signal in order to control the directivity of the transducer. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe as modified to provide a delay circuit configured to apply at least one predetermined time delay to the at least one converted signal in order to control the directivity of the transducer.

19. Claim 21 is essentially similar to Claim 20 and is rejected for the reasons stated above apropos of Claim 20.

20. Regarding Claim 22, Manabe as modified discloses the acoustic transducer array further includes a membrane disposed along an adjacent backplate, the backplate including a plurality of depressions formed on a surface thereof, and each acoustic transducer being defined by the membrane and one or more of the depressions (Haller, abstract; Figs. 1A-D; Hill, abstract; Figs. 2, 4, 8).

21. All elements of Claim 23 are comprehended by Claims 20 and 22. Claim 2 is rejected for reasons stated above apropos to Claims 20 and 22.

22. Claims 2-5, and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura as applied to claims 1, 10-17, and 19-23 above, and further in view of USPN 5619476 to Haller et al. (hereafter as Haller) and USPN 5745438 to Hill et al. (hereafter as Hill).

23. Regarding Claim 2, Manabe as modified discloses a plurality of transducer, but only generally; no specific hardware is taught. Therefore it would have been obvious to one having ordinary skill in the art to seek known transducers. Haller for example discloses an electrostatic ultrasonic transducer formed on a semiconductor substrate by micro-machining wherein the transducer includes a silicon nitride membrane supported above the surface of the substrate by insulating supports; and the substrate and membrane define the electrodes of the transducer (abstract; Figs. 1A-D). Hill for example, discloses transducers comprising an insulating sleeve, an electrode backplate situated within the sleeve, and a dielectric layer which secures the electrode backplate within the sleeve. The dielectric layer is a generally continuous layer and has support fingers protruding outwardly away from the electrode backplate for supporting an electrode diaphragm, preferably a durable metal foil (abstract; Figs. 2, 4, 8). It would have been obvious to one having ordinary skill in the art at to employ any known transducer, such as that of Haller or Hill. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe to have the plurality of transducer of Manabe be formed on a semiconductor substrate by micro-machining wherein the transducer includes a silicon nitride membrane supported above the surface of the substrate by insulating supports; and the substrate and membrane define the electrodes of the transducer (i.e. each acoustic transducer is a membrane-type transducer) or the have the plurality of transducer of Manabe comprise an insulating sleeve, an electrode backplate situated within the sleeve, and a dielectric layer which

secures the electrode backplate within the sleeve. The dielectric layer is a generally continuous layer and has support fingers protruding outwardly away from the electrode backplate for supporting an electrode diaphragm, preferably a durable metal foil (i.e. each acoustic transducer is a membrane-type transducer).

24. Regarding Claim 3, Manabe as modified discloses the membrane-type transducer is a Sell-type electrostatic transducer (Haller, abstract; Figs. 1A-D; Hill, abstract; Figs. 2, 4, 8).

25. Regarding Claim 4, Manabe as modified discloses the membrane-type transducer further includes a conductive membrane , a backplate electrode, and a DC bias source between the conductive membrane and the backplate electrode (Haller, abstract; Figs. 1A-D; Hill, abstract; Figs. 2, 4, 8).

26. Regarding Claim 5, Manabe as modified discloses at least one driver amplifier coupled between the modulator and the acoustic transducer array and configured to receive the converted signal and to generate an amplified signal representative of the converted signal (Manabe, Figs. 1, 3-4; column 3, lines 1-22). Manabe as modified does not expressly discloses a blocking capacitor coupled between the driver amplifier and the acoustic transducer array and configured to block the DC bias from the driver amplifier. However the examiner take Official Notice that it is well known in the art to provide a blocking capacitor coupled between the driver amplifier and the acoustic transducer array in order to prevent DC from entering. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe as

modified to provide a blocking capacitor coupled between the driver amplifier and the acoustic transducer array in order to prevent DC from entering.

27. All elements of Claim 7 are comprehended by Claim 4. Claim 7 is rejected for the reasons stated above apropos to Claim 4 (Hill, column 3, lines 49-62).

28. Regarding Claim 8, Manabe as modified discloses the Sell-type electrostatic transducer includes a conductive membrane, a backplate electrode, and a dielectric spacer disposed between the conductive membrane and the backplate electrode (Haller, abstract; Figs. 1A-D; Hill, abstract; Figs. 2, 4, 8).

29. Regarding Claim 9, Manabe as modified discloses the membrane-type transducer is a Sell-type electrostatic transducer including a conductive membrane, an electrode, and an insulative backplate disposed between the conductive membrane and the electrode (Haller, abstract; Figs. 1A-D; Hill, abstract; Figs. 2, 4, 8).

30. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura as applied to claims 1, 10-17, and 19-23 above, and further in view of USPN 5619476 to Haller, USPN 5745438 to Hill, and USPN 3565209 to Babcock et al (hereafter as Babcock).

31. Regarding Claim 6, Manabe as modified discloses at least one driver amplifier coupled between the modulator and the acoustic transducer array and configured to receive the converted signal and to generate an amplified signal representative of the converted signal (Manabe, Figs. 1, 3-4; column 3, lines 1-

22). Manabe as modified does not expressly disclose a first component coupled between the acoustic transducer array and the DC bias source and configured to block the amplified signal from the DC bias source. Babcock discloses an apparatus to generate an acoustic output that contains a choke (i.e. first component) to prevent the output current from an amplifier from flowing through a bias voltage source as part of a process to reduce distortion of a acoustic signal (Fig. 2; Fig. 3; column 2, lines 26-30 and lines 52-72). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the toy having a parametric speaker of Manabe as modified with the teaching Babcock to incorporate a choke between the acoustic transducer array and the DC bias source to prevent the output current from an amplifier from flowing through a bias voltage source as part of a process to reduce distortion of a acoustic signal.

32. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura as applied to claims 1, 10-17, and 19-23 above, and further in view of USPN 4122725 to Thompson.

33. Regarding Claim 18, Manabe as modified does not expressly disclose driving amplifier further including a damping resistor coupled between the inductor and the capacitive load of the acoustic transducer array. Thompson discloses use of an inductor and a damping resistor that are connected electrically across transducers. The inductor resonates with a clamped

capacitance of the transducer at a resonant mode frequency of the transducer elements so that a significant amount of driving energy is dissipated in the damping resistor (column 2, lines 52-60). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the toy having a parametric speaker of Manabe as modified with the teaching Thompson to incorporate a damping resistor coupled between an inductor and a capacitor to allow the inductor resonates with a clamped capacitance of the transducer at a resonant mode frequency of the transducer elements so that a significant amount of driving energy is dissipated in the damping resistor.

34. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura as applied to claims 1, 10-17, and 19-23 above, and further in view of USPN 4005382 to Beaver.

35. Regarding Claim 24, Manabe as modified does not expressly discloses the delay circuit is configured to apply a predetermined time delay, d, according to the expression $d = (x \cdot \sin(\theta))/c$, wherein "x" is the distance from a datum to a respective acoustic transducer and "c" is the speed of sound. Beaver discloses proper selection of the delay value between adjacent transducer can accomplish preferential ultrasonic reception or transmission in particular directions (abstract). The delay value is given by the expression $Y = (d/c) \sin \theta$, where "d" is the spacing between adjacent transducer elements, "c" is the velocity of the

ultrasonic wave in the medium through which it travels, and "θ" is the steering angle (column 3, lines 41-68; column 7, line 62 to column 8, line 48). Therefore it would have been obvious to one having ordinary to modify Manabe as modified with the teaching of Beaver to utilize a delay value between adjacent transducer can accomplish preferential ultrasonic reception or transmission in particular directions.

36. Claims 25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5619476 to Haller.

37. Regarding Claim 25, Haller discloses an acoustic transducer array, comprising:

a backplate including a surface and a plurality of respective depressions of varying dimensions formed on the surface (abstract; Figs. 4A-4E; column 3, line 40 to column 4, line 26); and

a membrane adjacently disposed along the backplate (abstract; Figs. 4A-4E; column 3, line 40 to column 4, line 26),

wherein the membrane and at least one of the plurality of respective depressions define at least one acoustic transducer (abstract; Figs. 4A-4E), and

wherein the dimensions of the respective depressions are set to determine the center frequency and the bandwidth of the at least one acoustic transducer (abstract; Figs. 4A-4E; column 3, line 40 to column 4, line 26).

Haller discloses transducers which can efficiently generate and receive ultrasound in air over a broad band of frequencies, but does not expressly

discloses wherein the acoustic transducer array has a bandwidth greater than 5 kHz. However the examiner take Official Notice that it is well known in the art to have the transducers which can efficiently generate and receive ultrasound in air over a broad band of frequencies to generate a desired bandwidth, such as a bandwidth greater than 5 kHz in order to obtain a desired sound quality. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Haller to have the transducers which can efficiently generate and receive ultrasound in air over a broad band of frequencies to generate a desired bandwidth, such as a bandwidth greater than 5 kHz in order to obtain a desired sound quality.

38. All elements of Claim 27 are comprehended by Claim 25. Claim 27 is rejected for the reasons stated above apropos to Claim 25.

Conclusion

39. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

USPN 6052336 to Lowrey, III discloses an apparatus and method of broadcasting audible sound using ultrasonic sound as a carrier.

40. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Corey P. Chau whose telephone number is (571)272-7514. The examiner can normally be reached on Monday - Friday 9:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chin Vivian can be reached on (571)272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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CPC